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17 July 1959

(IN TRIPLICATE)

Washington, D. C.

Attention: Mr.


Subject: Contract No. 605
Task Order No. 1
Transportable Inflatable Antenna System
Instruction Books, Submission of

Enclosure: (A) Instruction Book for Transportable
Inflatable Antenna System, twenty (20)
copies

Gentlemen:

Pursuant to the terms and provisions of the subject contract, the contractor submits Enclosure (A), described above, as fulfilling the requirements for instruction books set forth therein. Due to the fact the subject contract does not set forth an applicable shipping address for the instruction books, the books are being transmitted to your attention with the understanding that the books will be distributed to the applicable parties.

Very truly yours,

N. K. 
Contract Administrator
NKG:js

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ING THE NATIONAL DEFENSE OF THE UNITED STATES
WITHIN THE MEANING OF THE ESPIONAGE LAWS,
TITLE 18, U. S. C., SECTIONS 793 AND 794. ITS
TRANSMISSION OR THE REVELATION OF ITS CON-
TENTS IN ANY MANNER TO AN UNAUTHORIZED
PERSON IS PROHIBITED BY LAW.

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INSTRUCTION BOOK

TRANSPORTABLE INFLATABLE ANTENNA SYSTEM

350 TO 10,000 MC

**523 0015 00
15 JUNE 1959**

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PRINTED IN THE UNITED STATES OF AMERICA

1.1 GENERAL.

The Transportable Inflatable Antenna System shown in figures 1 and 2 is a lightweight, quickly erected, high gain antenna system in the 350- to 10,000-mc frequency range. It is directional and can be either vertically or horizontally polarized as desired. The antenna system is composed of a 6-1/2-foot inflatable parabolic reflector and feed system covering 350 to 6000 mc, and a two-foot dish reflector and feed horn covering 6000 to 10,000 mc.

The antenna system consists of four main subassemblies:

- a. the base assembly, which consists of a portable folding base or a base mounting plate, guy chains, mast, and anchors for outdoor mounting;
- b. the inflatable dish assembly, consisting of an inflatable reflector and supporting framework;
- c. the logarithmic periodic feed assembly for the inflatable reflector consisting of four support legs, spider, and periodic feed pyramid;
- d. and the two-foot dish antenna, which mounts on the frame of the inflatable reflector and covers the higher frequency range of the antenna system.

The electrical characteristics of the antenna system are given in the charts included. A plot of beamwidths in degrees as a function of frequency, for both antennas (figure 7), a plot of gain in db/dipole as a function of frequency for both antennas (figure 8), the input vswr as a function of frequency for the 6-1/2-foot reflector (figure 9), and three charts of radiation patterns for the 6-1/2-foot reflector (figure 11, figure 12, figure 13) are given. The vswr of the two-foot antenna as a function of frequency (figure 9) and two charts of radiation patterns for the two-foot dish (figure 14, figure 15) are also shown.

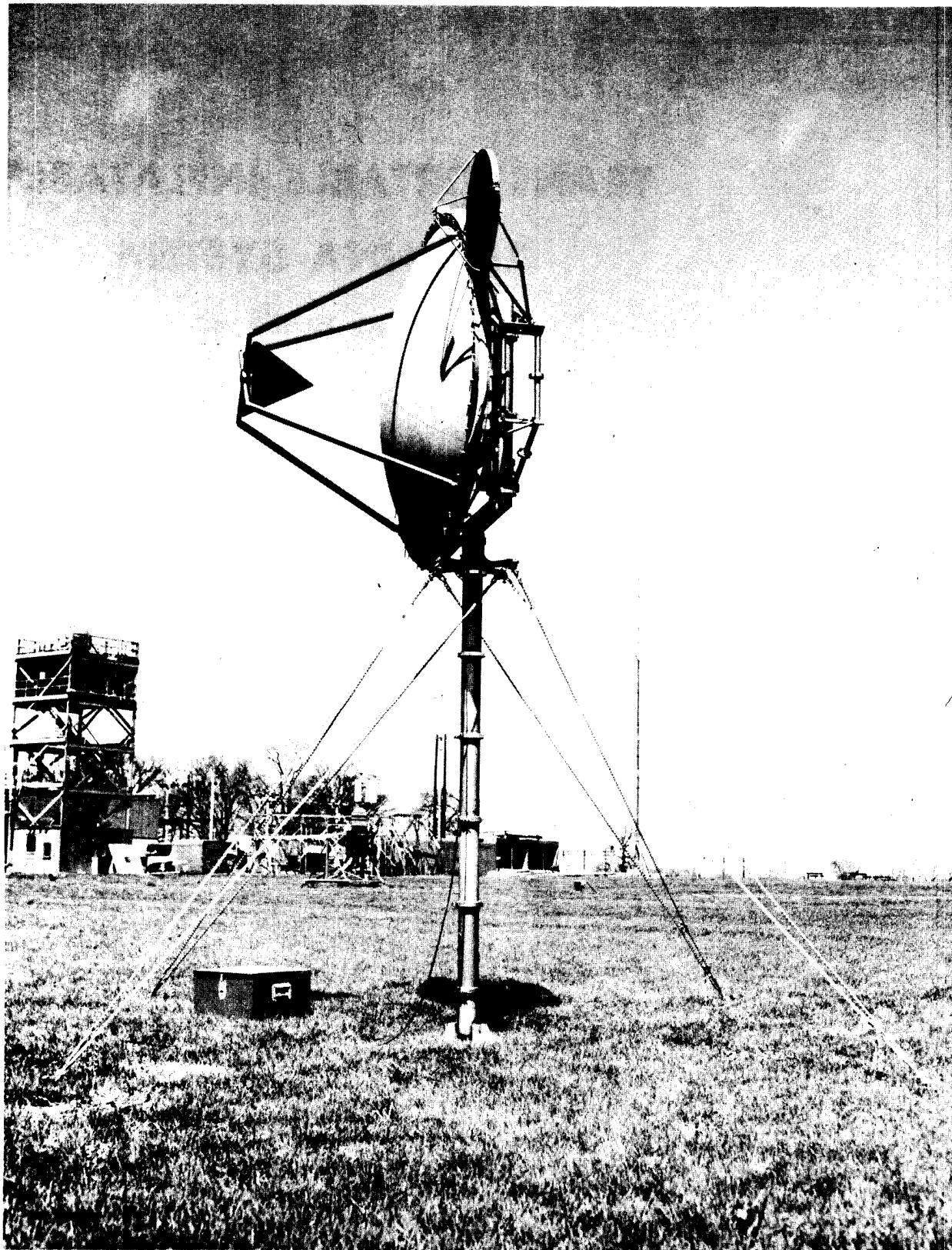


Figure 1. Transportable Inflatable Antenna System on Guyed Mast

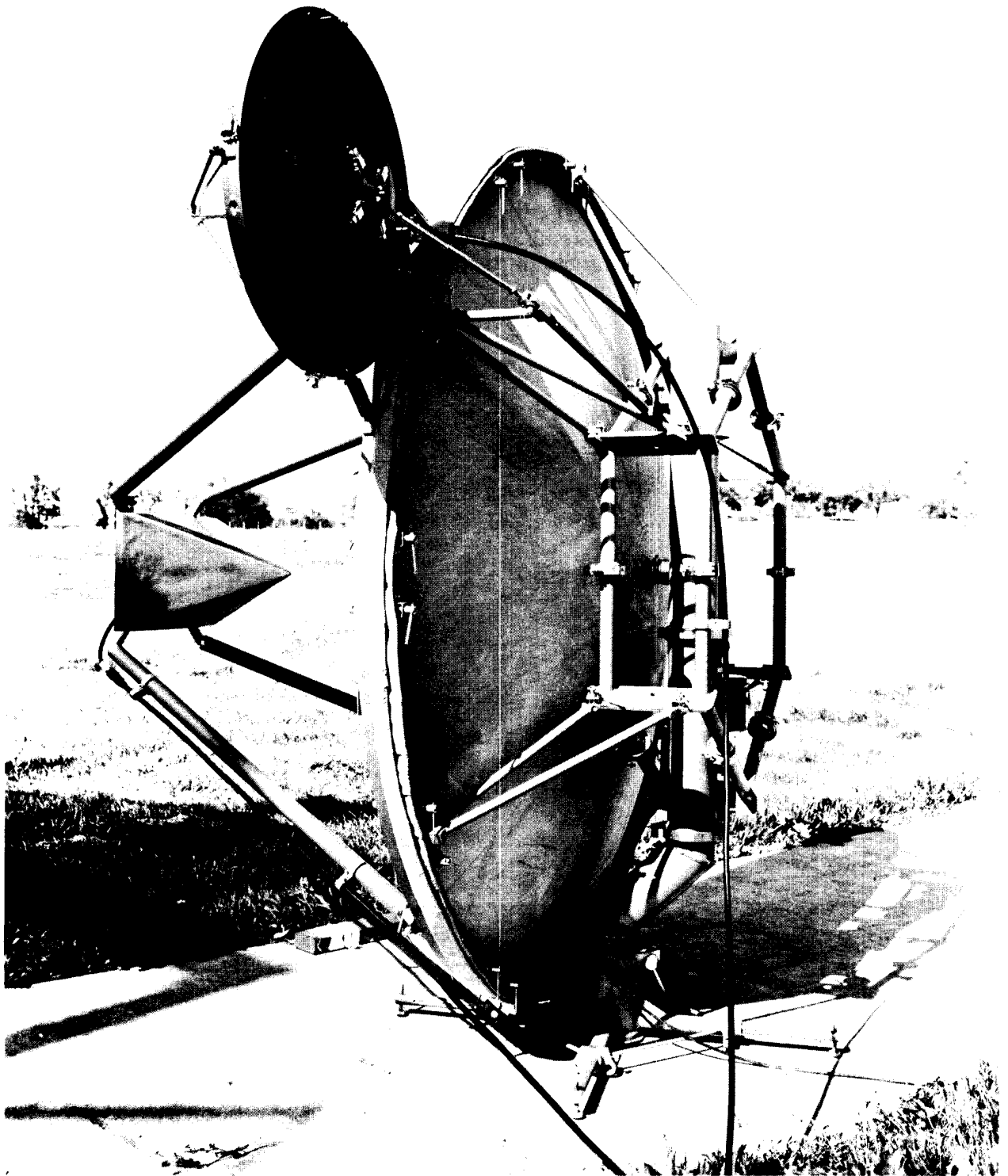


Figure 2. Transportable Inflatable Antenna System on Portable Base

2.1 ASSEMBLY INSTRUCTIONS (Figure 16).

- a. Assemble the six frame sections together to form a hexagon-shaped center frame section. The top and bottom sections have special hand nuts that distinguish them from the remaining sections. Place these sections so the threaded portion of the hand nut points to the right when one is looking down at the antenna from the front. Note the position of the ring support holes. Figure 3 shows the frame assembly in detail. The pipe mast is shown in the background of the photo. Fasten together with twelve 2-5/8 in. diameter V-clamps. Tighten wing nuts on V-clamps.
- b. Attach six ring supports to the basic frame section. Five supports are identical; one is special and is used to support the small dish antenna that attaches to the side of the main structure. Assembly should be such that the special ring support will be on the upper right when one is facing the antenna. Figure 3 is keyed to show the position of the special ring support arm.
- c. Assemble the center support mast with large 6-5/8-in. diameter V-clamps and fasten the mast to the frame assembly. Assemble first the top, middle, and bottom sections of the center mast. The attachment blocks on the top and bottom sections should be parallel with

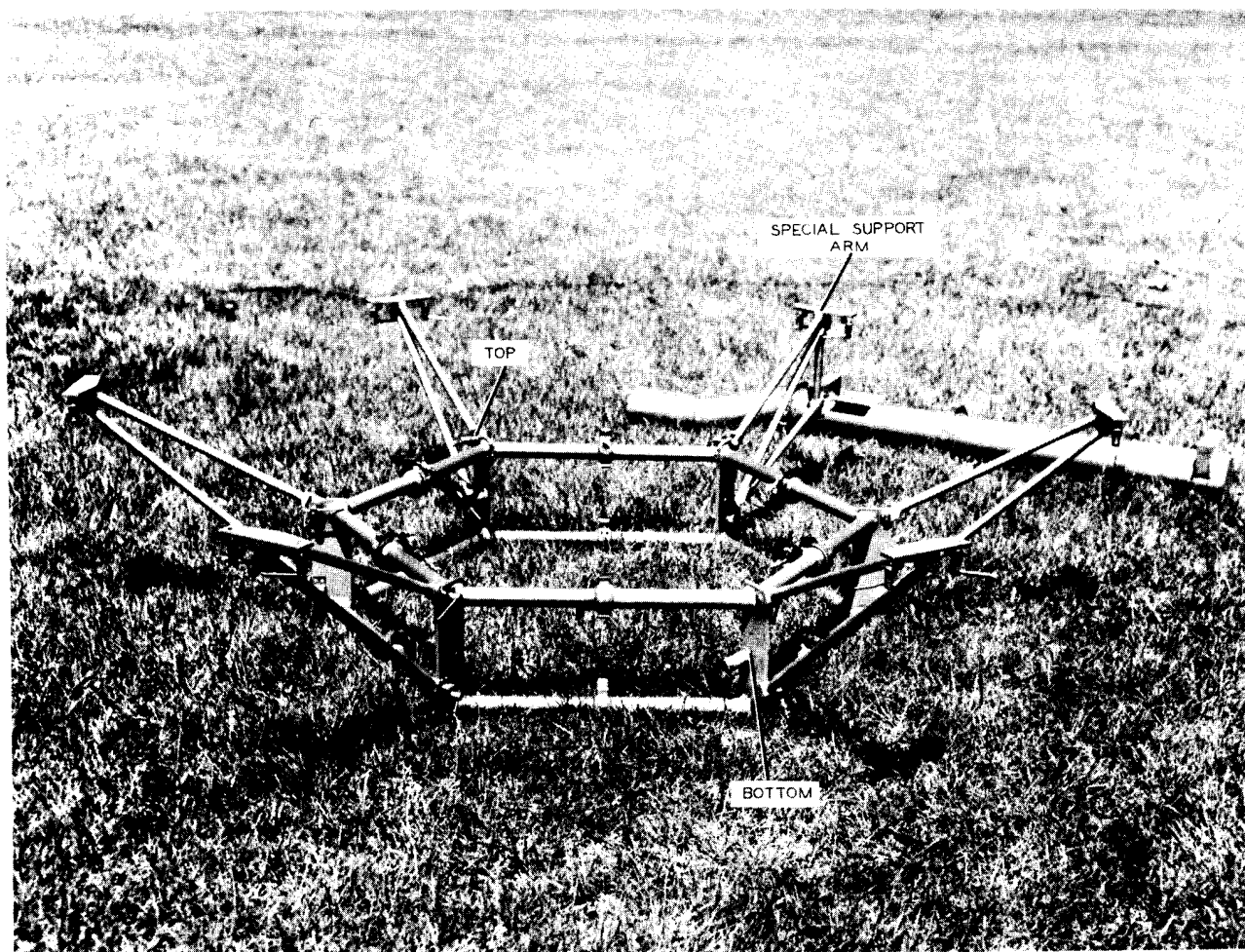


Figure 3. Ring Support Assembly

each other so that they properly fit on the frame assembly. Attach the mast to the right side of the center frame sections. Next attach the lower (crooked) section to the bottom mast section so that there is 2-1/2-in. clearance between the ring support and the edge of the lower (crooked) mast section.

d. Assemble the 12 back ring pieces to the ring supports using hand nuts. Six splice plates join sections not joined at ring supports.

e. Attach the reflecting portion of the inflatable dish, fitting it over the mounting studs on the back ring pieces.

f. Attach the front nonreflecting portion of the inflatable dish over the reflecting portion, fitting it over the mounting studs on the back ring. The inner rope circle of cover and reflector must lie outside all ring sections.

g. Attach the front ring sections to back ring mounting studs. Lay out the front ring sections in position on the antenna so that they overlap the joints on the back ring. The special ring section with the small dish supports should be on the upper right, as is the special ring support. Lay out the four feed support brackets and place at 45 degrees from the vertical and horizontal center lines of the antenna. Assemble the feed support brackets and the adjacent ring sections at the same time. Be sure that the inner rope circle of the cover and reflector lie outside all ring sections. Attach four hand nuts on each front ring section. After all front ring sections and feed support mounting brackets are assembled, lightly hand-tighten the hand nuts around the front ring.

h. Attach the blower assembly to the support mast. The blower assembly slips onto the special mount on the side of the support mast. Clamp the blower hose to the center of the inflatable reflector. Wire the blower as shown in figure 4 for 115-v a-c or 230-v a-c as desired. A 12-v d-c converter and converter cable is furnished for use where 115-v a-c is not readily available. Inflate the antenna with all hand nuts lightly hand tightened. Jar the ring sections so that the air pressure in the antenna will pull the ring into its proper shape. Then tighten all hand nuts, again making sure the inner rope circle of the inner and outer covers are outside the ring sections. Carefully check the seal to see that no air leaks exist. Air pressure in the inflatable reflector should be maintained at seven inches of water.

i. Attach pedestal (for indoor use) to the supporting mast, expand legs, and tighten. The hand nut clamping the pedestal to the supporting mast may be loosened to rotate the antenna. Azimuth is indicated on the azimuth ring on the supporting mast.

j. Assemble the feed support legs to the mounting brackets on the front ring of the antenna.

k. Attach the pyramid support cross (spider) to the four feed support legs.

m. Attach the logarithmic periodic feed pyramid. The feed pyramid can be turned for either vertical or horizontal polarization as indicated by the instructions stenciled on the pyramid itself.

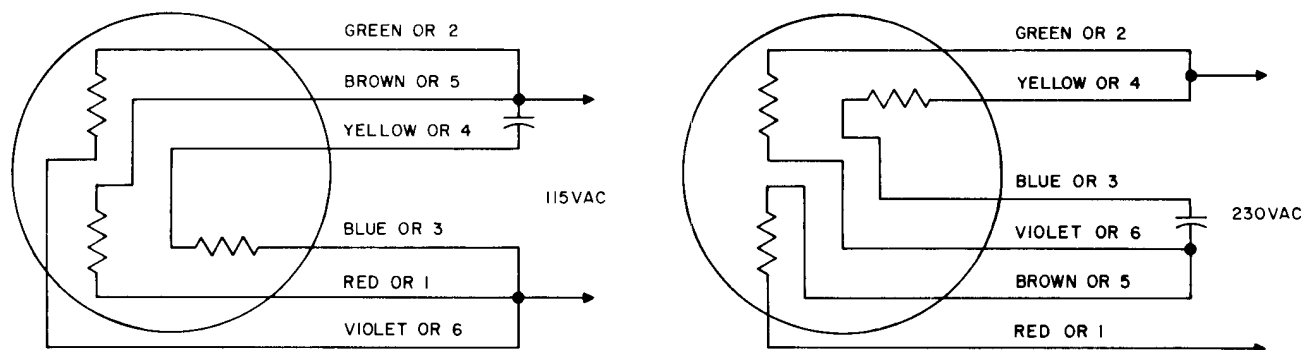


Figure 4. Blower Wiring for 115-V A-C or 230-V A-C

CAUTION

The Fiberglas case of the feed pyramid is fragile; handle with care.

n. Assemble the small dish antenna, clamping the four dish sections together as indicated in the assembly drawing (figure 16). Attach the feed horn assembly and fasten the small dish to the special support mounting brackets on the side of the large antenna. Mount the small dish so that the feed line attachment is at the bottom or left of the small antenna. Attach the semiflexible feed line to the small dish and clamp the feed line to the vertical portion of the hexagon frame with one clamp. Polarization of the small dish is changed by turning the entire antenna 90 degrees as indicated on the feed horn.

CAUTION

Do not kink or sharply bend the semiflexible coaxial feed line. Be extremely careful in shaping this line to avoid damage. Minimum bend radius is six inches.

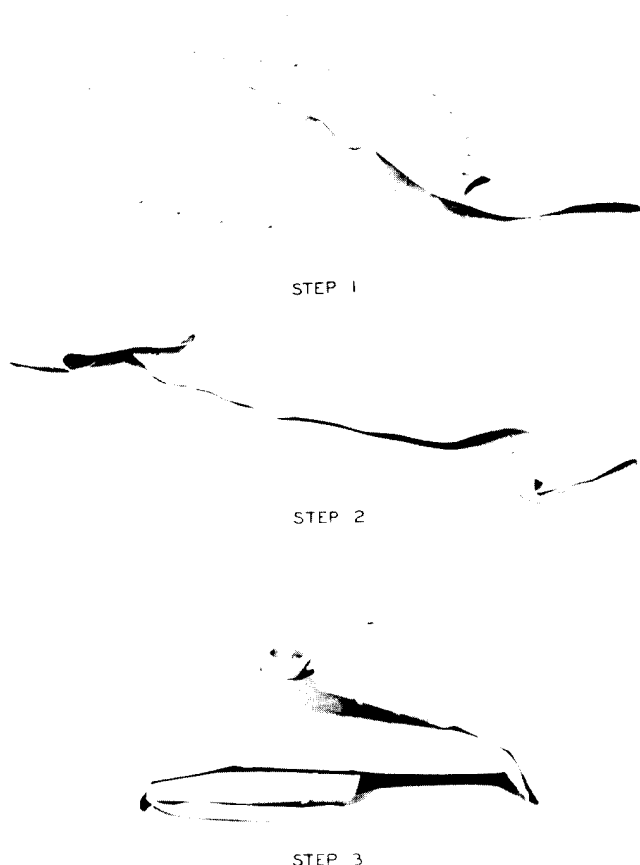


Figure 5. Folding of Inflatable Reflector and Cover

- o. Attach the small coaxial line jumper to the feed pyramid with the right-angle fitting. The other end of the jumper attaches to a length of semiflexible coaxial feed line which clamps to one of the lower feed support legs with two clamps.
- p. The antenna may be mounted outdoors with the special plate furnished. Guy chains and anchors are furnished along with a maul for driving the anchors. The guys should be staked nine feet from the base of the antenna regardless of mast height.

3.1 MAINTENANCE AND PACKING.

The complete antenna system is packed in transportable metal boxes. Figure 6 shows the items packed in each box and a suggested manner of arranging the items. Each box contains the following items:

NUMBER	BOX	MFR'S SKETCH NO.
1	Box 1 Logarithmic periodic feed pyramid	4020 D 351

NUMBER	BOX	MFR'S SKETCH NO.
	Box 2	
3	V-band clamp assemblies 6-5/8 in. dia.	4020 A 88
1	Top mast section	4020 C 126
1	Center mast section	4020 B 128
1	Bottom mast section	4020 C 143
1	Lower mast section	4020 C 149
1	Base assembly	4020 D 180
	Box 3	
12	V-band clamp assemblies 2-5/8 in. dia.	044 1273 12
4	Frame section assembly, no. 1	4020 C 171
1	Frame section assembly, no. 2	4020 C 172
1	Frame section assembly, no. 3	4020 C 173
	Box 4	
1	Spider assembly	4020 A 96
5	Support rings	4020 D 167
1	Special ring support	4020 D 166
1	2 ft. parabolic reflector, 4 sections	4020 D 342
1	Partition board	4020 B 85
1	Inflatable cover	4020 C 119 ✓
	Box 5	
12	Ring section assemblies, back	4020 B 153
11	Front ring section assemblies	4020 C 169
1	Special ring section assembly	4020 C 170
6	Splice plate assemblies	4020 B 214
4	Feed leg bracket assemblies	4020 B 380
	Box 6	
1	Coaxial clamp assembly - No. 3	4020 A 89
2	Coaxial clamp assembly - No. 2	4020 A 90
1	Spool assembly for coaxial line	4020 A 92
1	Coaxial line jumper assembly	4020 A 93
2	Cable assembly - long	4020 A 94
4	Cable assembly - short	4020 A 95
1	Tool kit	4020 A 97
	Box 7	
1	Reflector	4020 C 118 ✓
1	Horn leg ass'y - No. 2	4020 B 343
1	Horn leg ass'y - No. 3	4020 B 344
1	Horn leg ass'y - No. 4	4020 B 345
1	Blower cable	4020 A 354
1	Blower motor	4020 D 357

NUMBER	BOX	MFR'S SKETCH NO.
	Box 7 (Cont)	
12	Spider support legs	4020 C 364
1	Small horn ass'y	4020 C 383
1	Converter-vibrator	044 0011 30
1	Converter cable ass'y	4020 A 86
1	Partition board	4020 B 85
1	Dish support	4020 C 196
	Box 8	
6	V-band clamp assy 6-5/8 in. dia.	4020 A 88
2	Coaxial clamp assy - No. 1	4020 A 91
5	Center mast sections	4020 B 128
4	Stake--base	4020 B 155
1	Tower base assy.	4020 A 359
	Box 9	
4	Anchors	4020 C 228
4	Chain	4020 A 358
1	Maul	4020 B 87

Special care should be exercised when folding the inflatable reflector and cover of the antenna. These items should be folded as indicated in figure 5.

A protective coating of Hypalon should be applied annually to the outer surfaces of the cover and reflector fabrics if used outdoors.

3.1.1 BLOWER. The blower contains sealed bearings and does not require lubrication.

CAUTION

Irreparable damage to the cover and reflector fabrics on an erected antenna can result if the fabrics remain uninflated and unprotected from the wind. If the antenna must be left uninflated for extended periods of time, shield the fabric from the major force of the wind. This can be done by tying a canvas cover over the reflector.

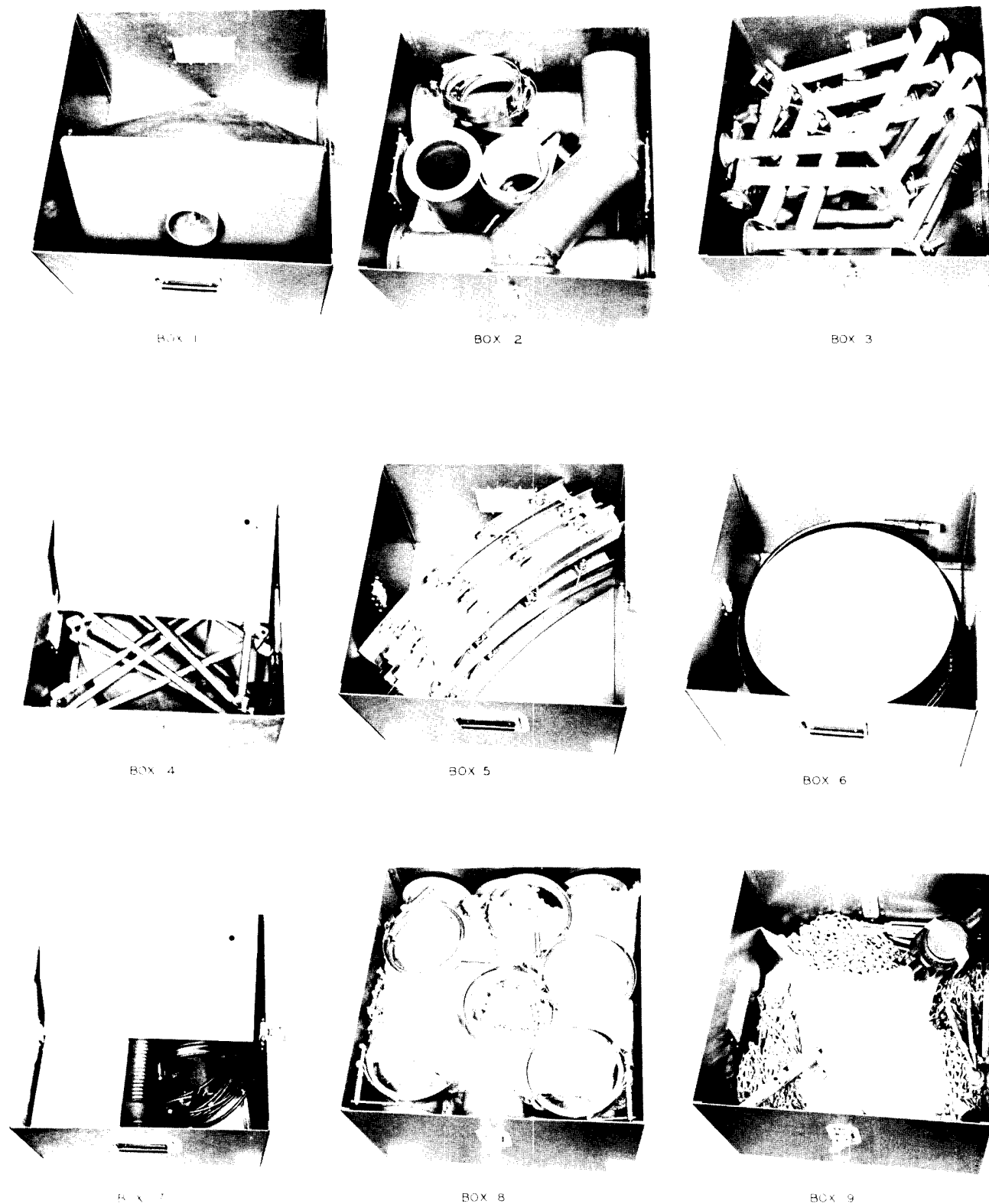


Figure 6. Antenna System Packed in Transportable Metal Boxes

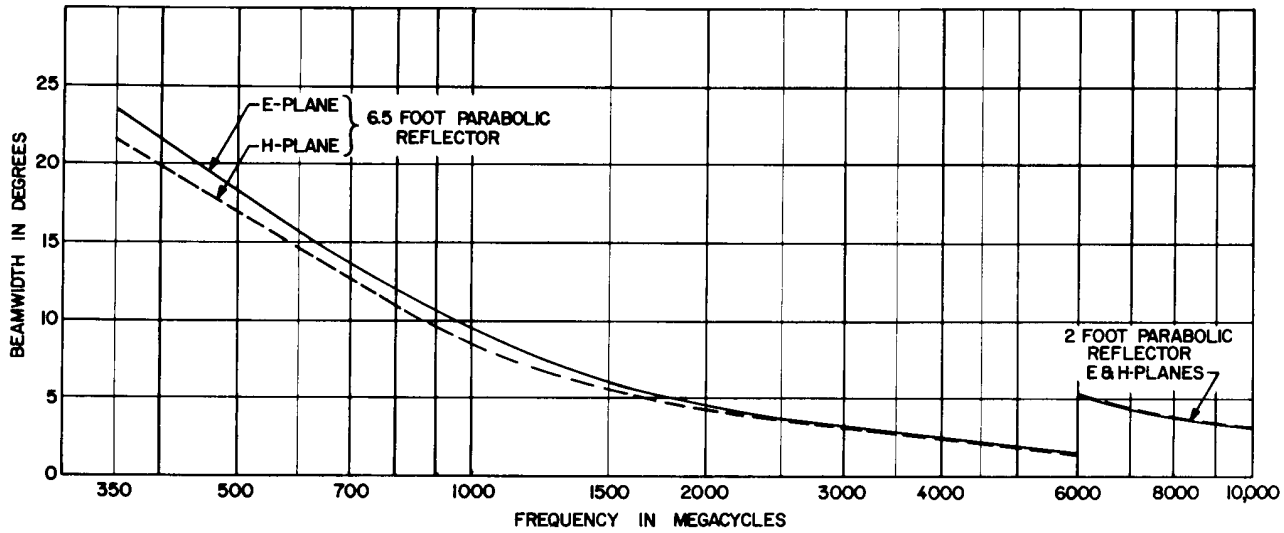


Figure 7. Beamwidth in Degrees as a Function of Frequency

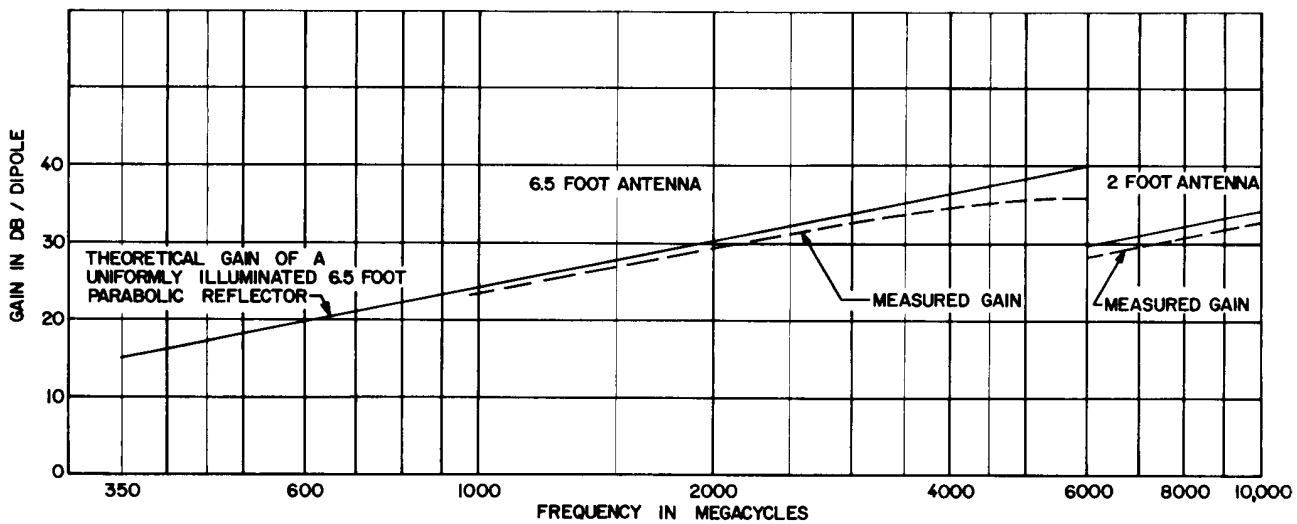


Figure 8. Gain in Db over a Dipole as a Function of Frequency

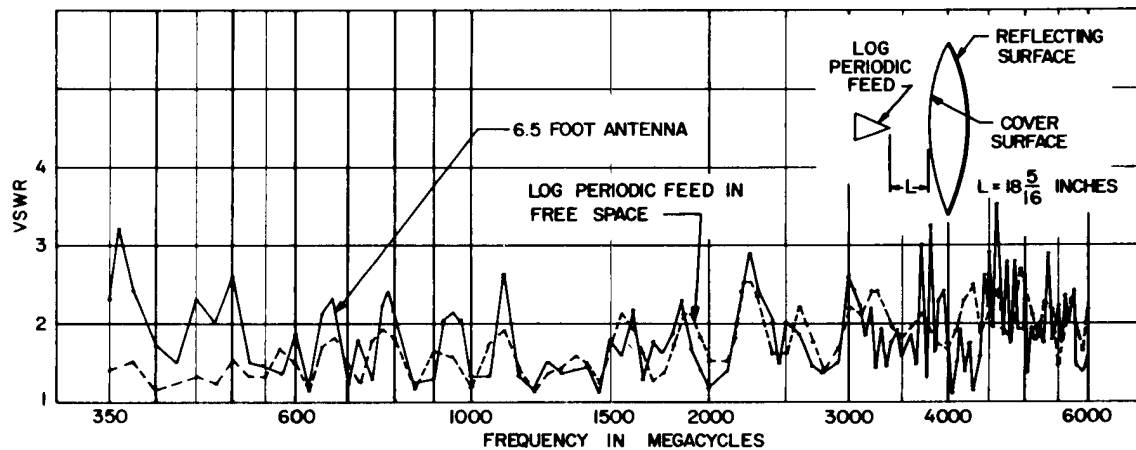


Figure 9. Input VSWR as a Function of Frequency,
6-1/2 Ft. Antenna

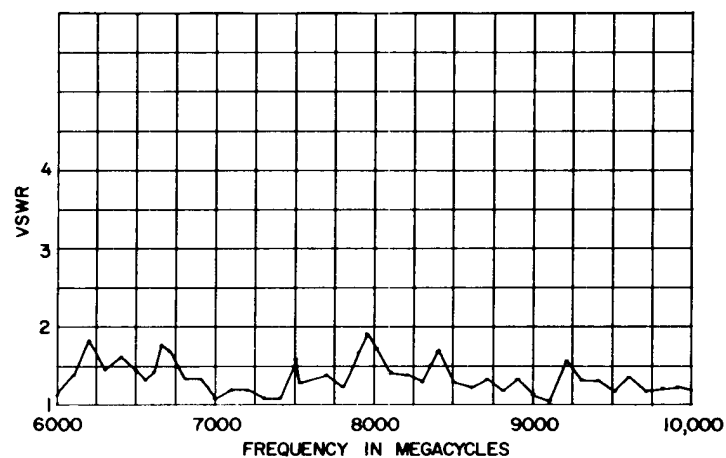


Figure 10. Input VSWR as a Function of Frequency,
2 Ft. Antenna

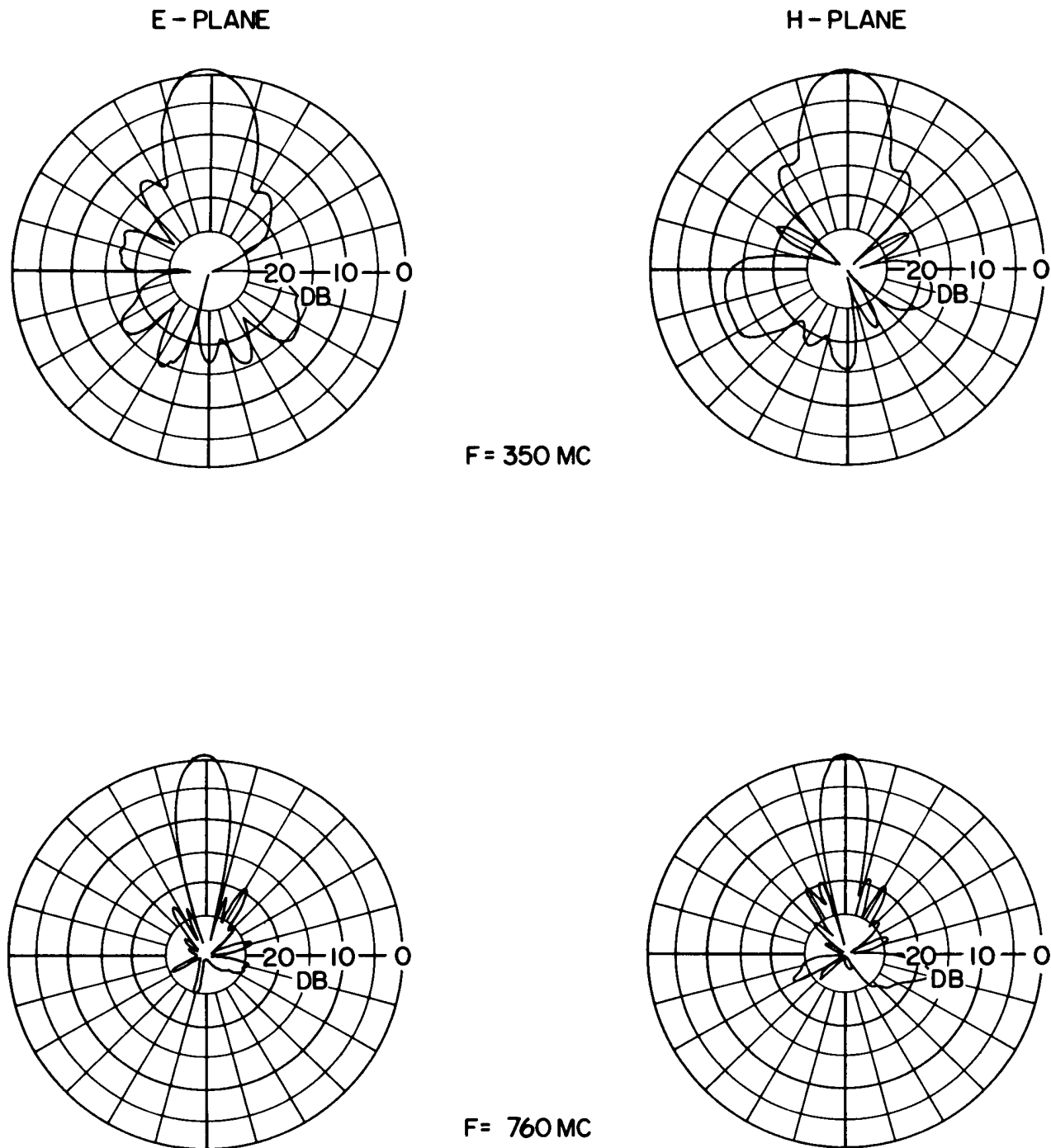


Figure 11. Radiation Patterns of 6-1/2 Ft. Antenna,
350 and 760 Mc.

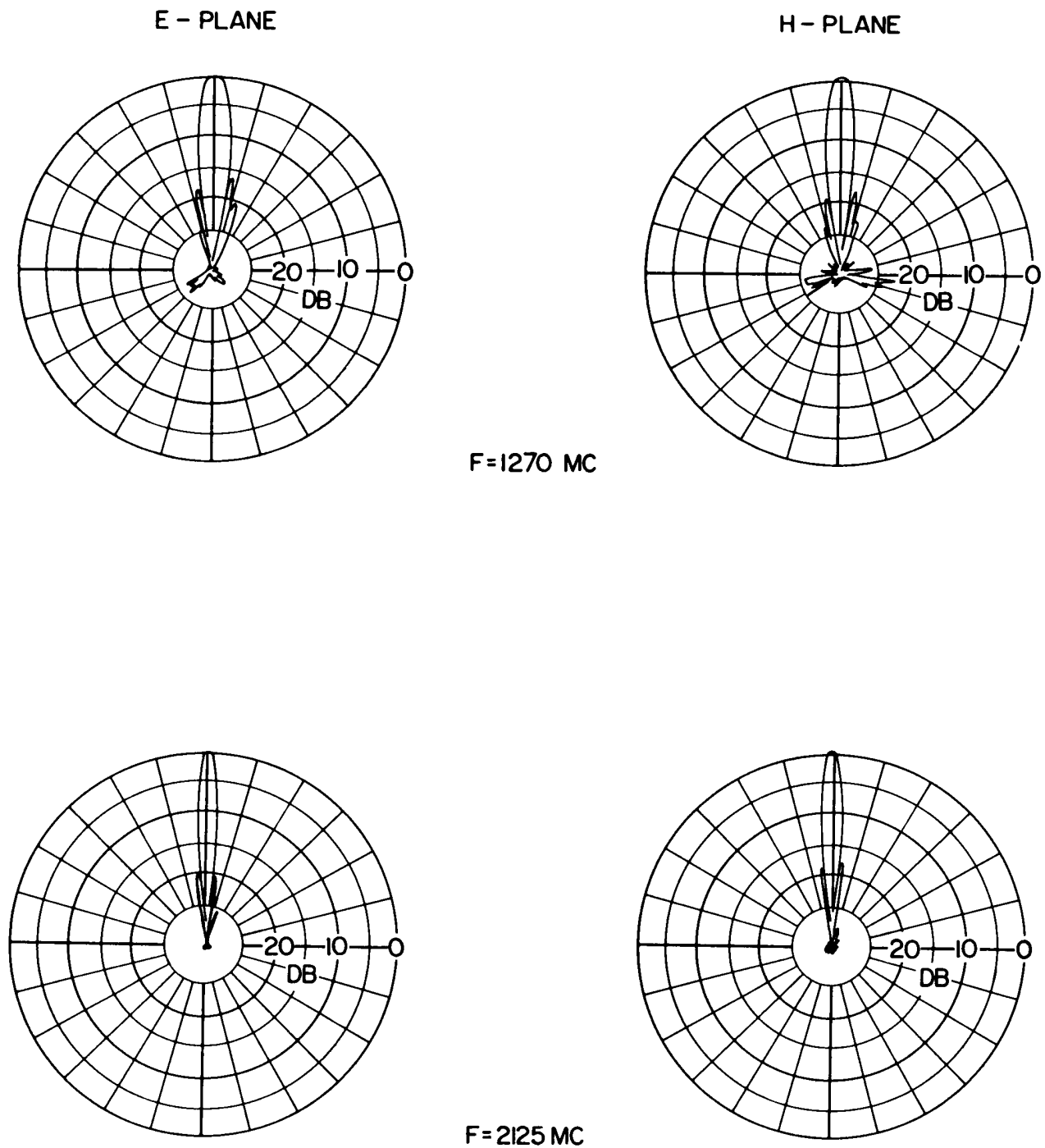


Figure 12. Radiation Patterns of 6-1/2 Ft. Antenna,
 1270 and 2125 Mc.

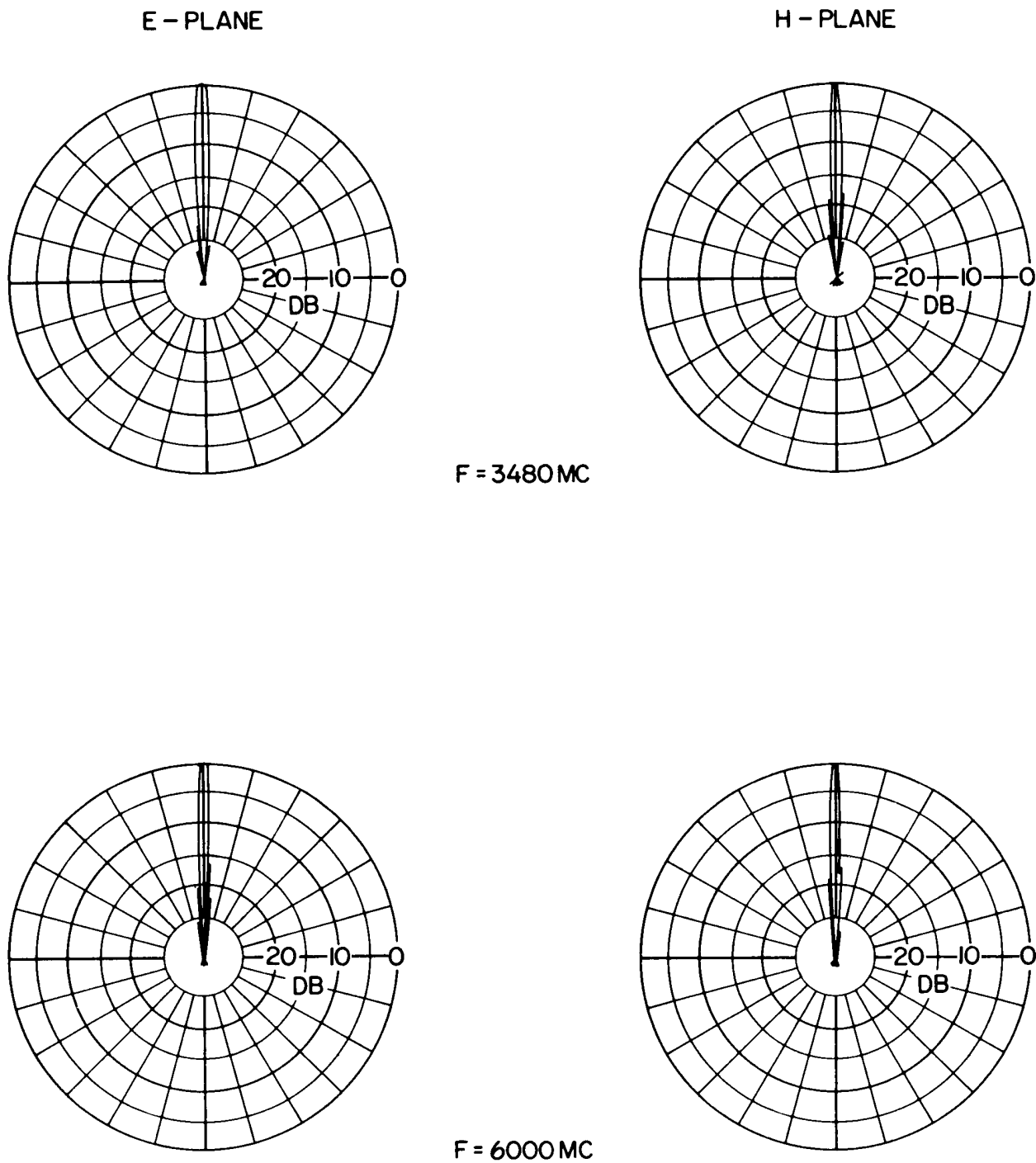


Figure 13. Radiation Patterns of 6-1/2 Ft. Antenna,
3480 and 6000 Mc.

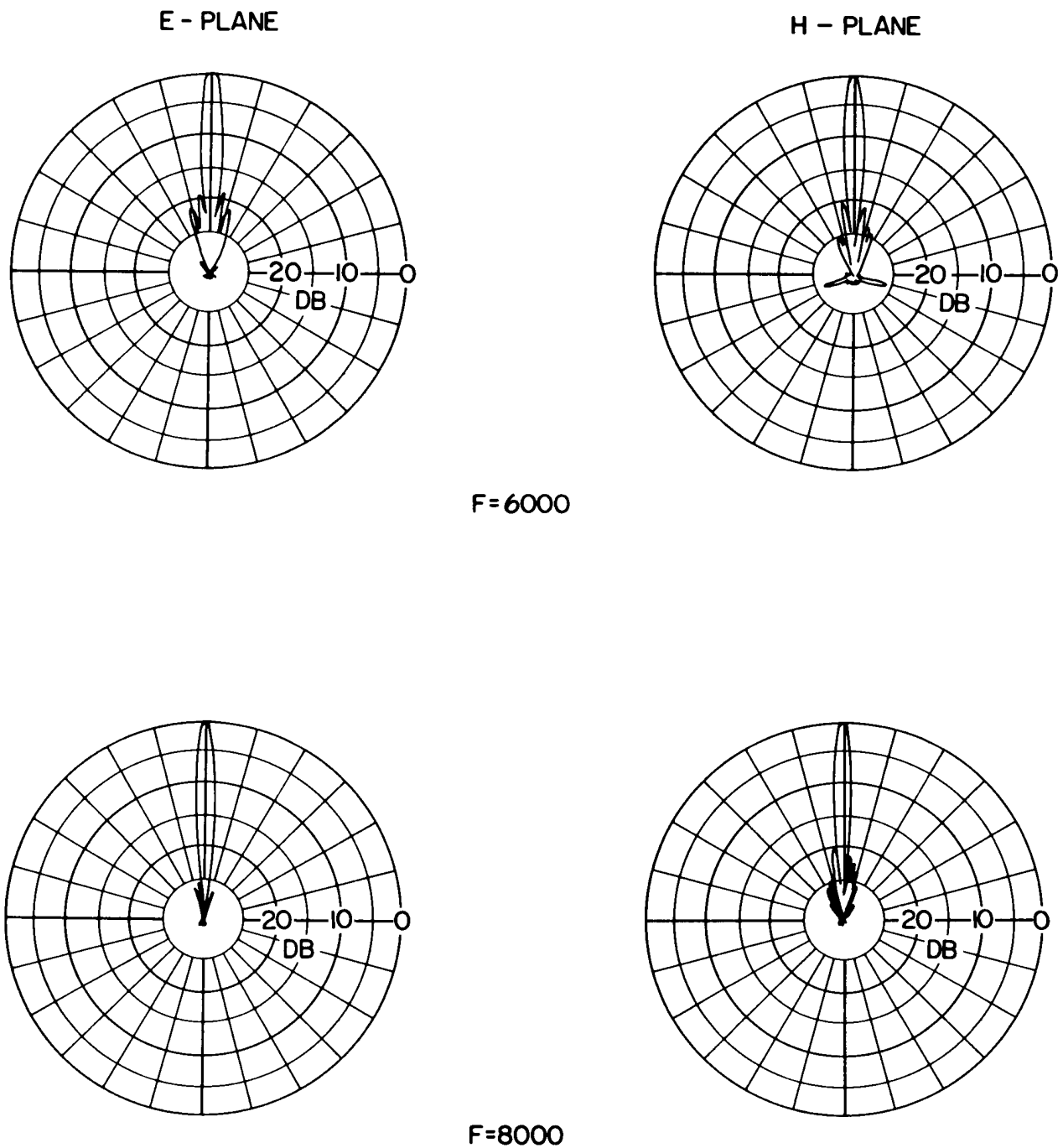


Figure 14. Radiation Patterns of 2 Ft. Antenna,
6000 and 8000 Mc.

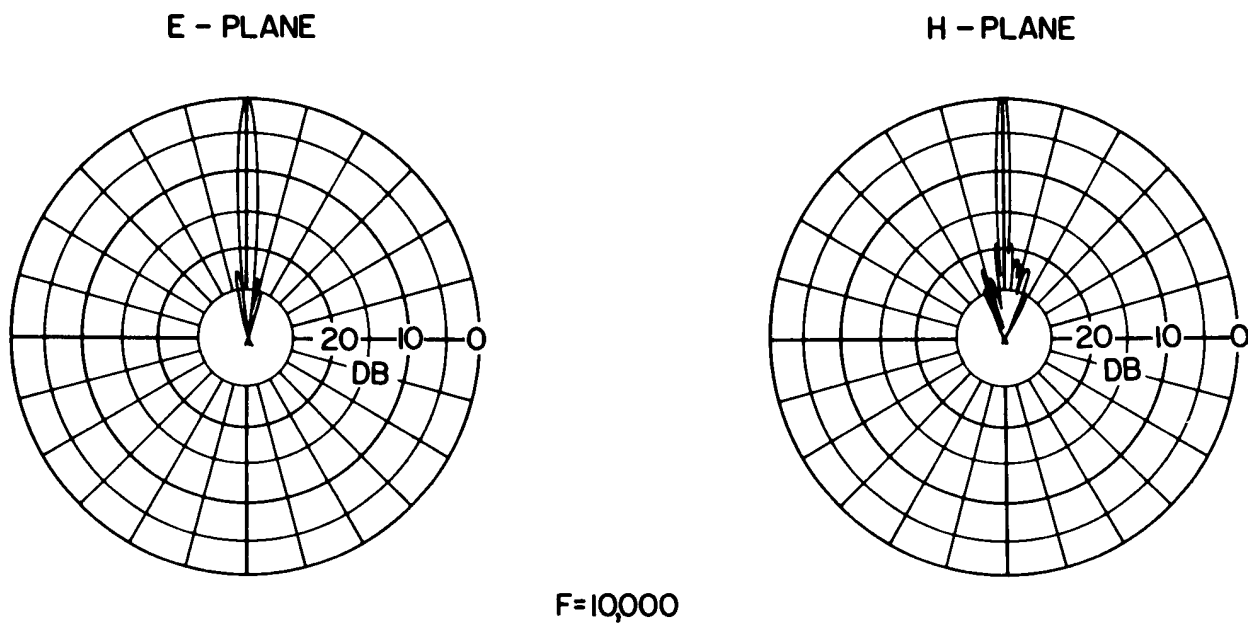


Figure 15. Radiation Patterns of 2 Ft. Antenna,
10,000 Mc.

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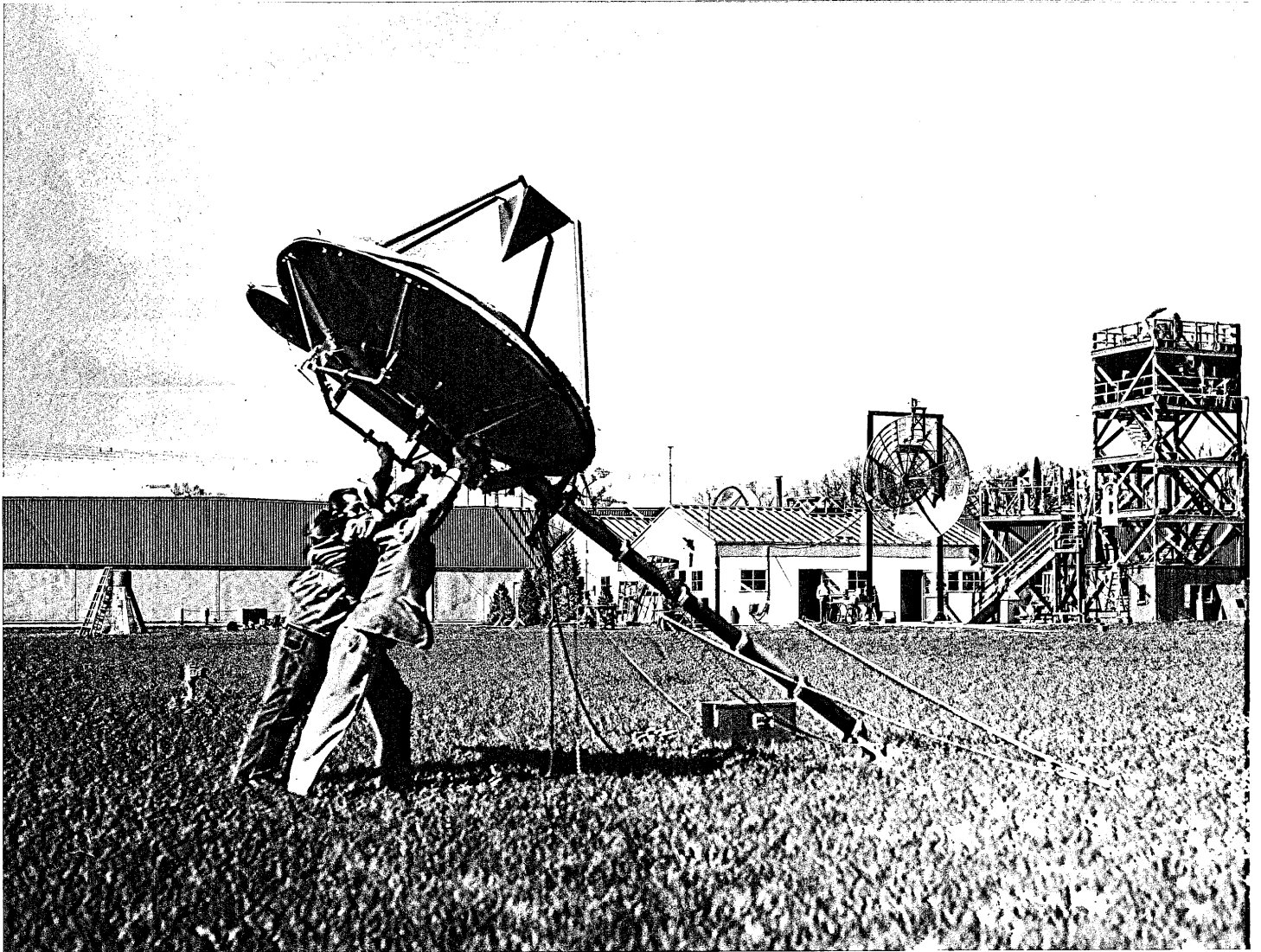
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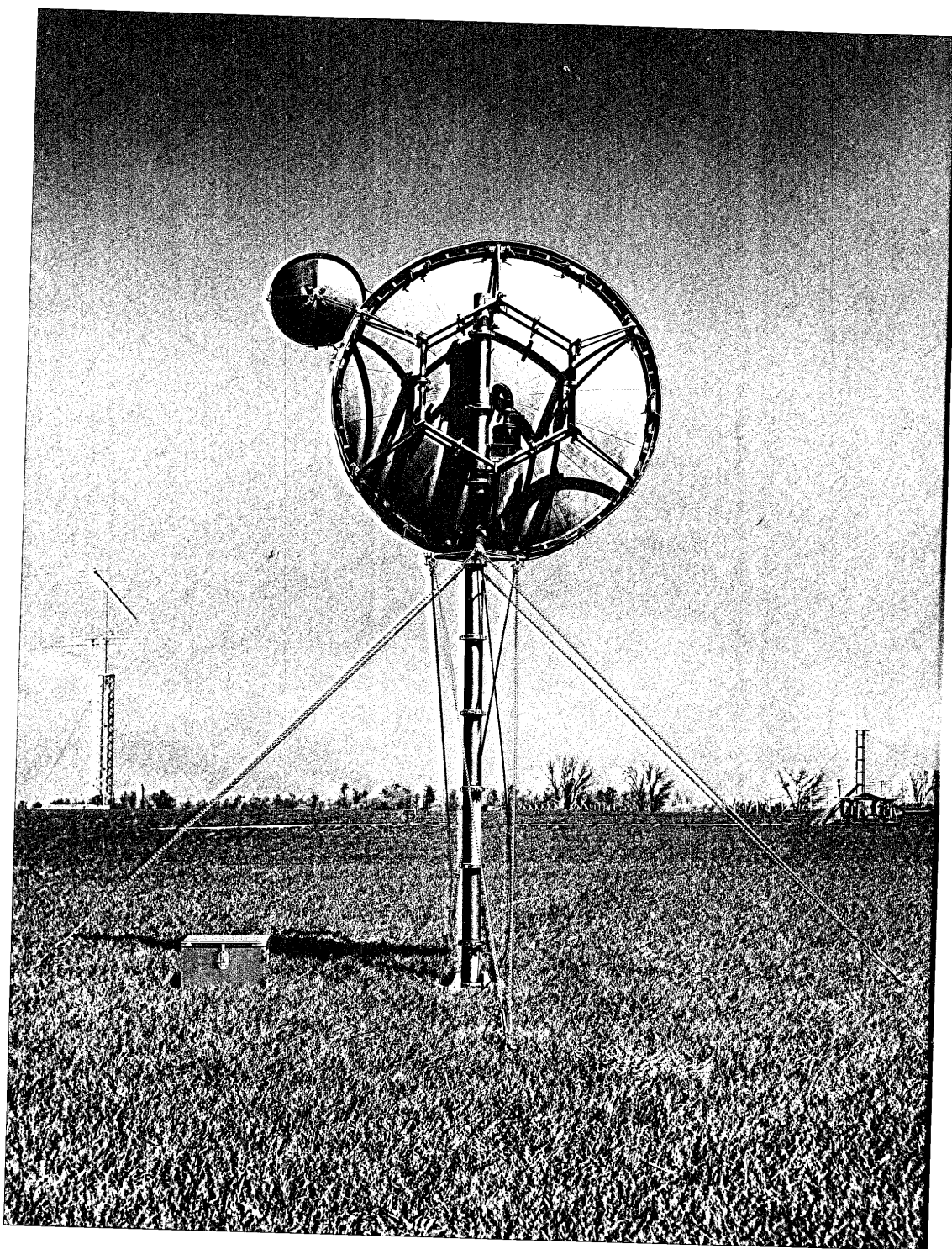
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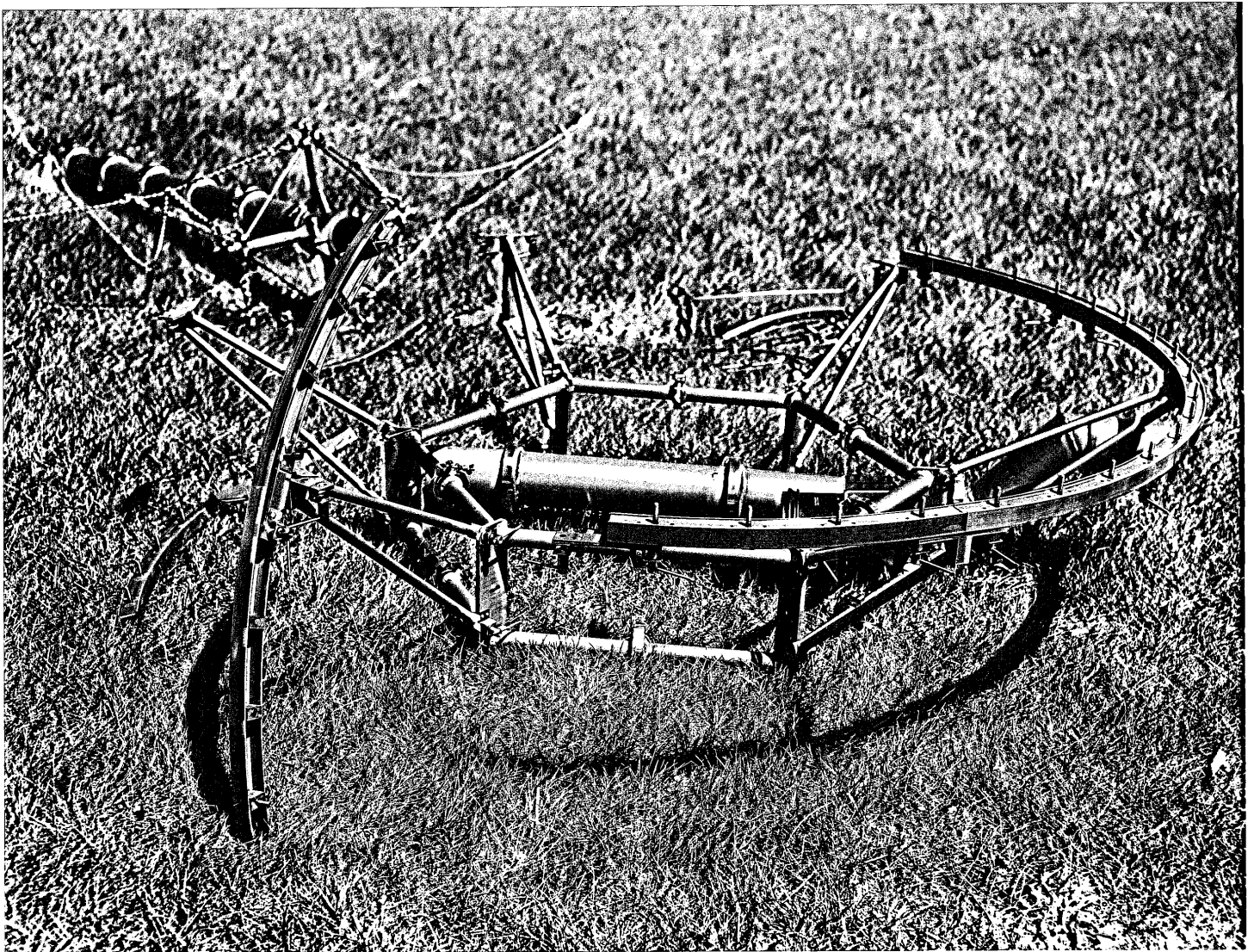
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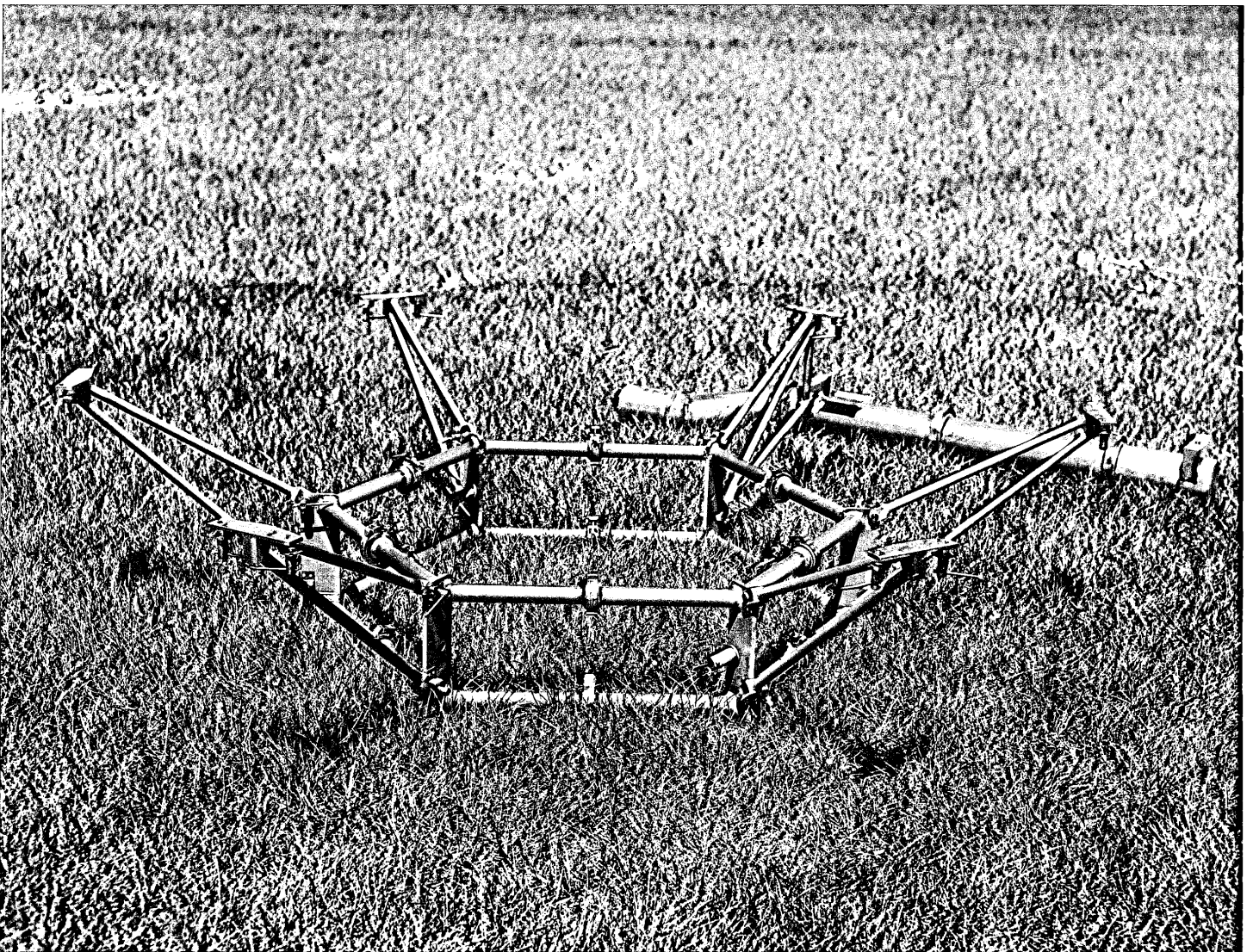
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